DOCUMENT RESUME

ED 213 760 TM 820 195

AUTHOR Jaeger, Richard M.; Tittle, Carol Kehr
TITLE Validity and Sex Differences in the Structure of Adolescent Values.
PUB DATE Mar 82
NOTE 36p.; Paper presented at the Annual Meeting of the American Educational Research Association (66th, New York, NY, March 19-23, 1982).

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Career Choice; *Factor Structure; Grade 11; Maximum Likelihood Statistics; Secondary Education; *Sex Differences; *Test Validity; *Values

ABSTRACT

Two perspectives provide the theoretical framework for this study. The first provides confirmatory maximum likelihood estimates of factor loadings and factor intercorrelations; the second, and more important, provides statistical tests of hypotheses that factor structures and patterns of values are invariant for female and male adolescents. The confirmation of different factor structures and patterns of adolescents' ratings of values regarding career decisions, as well as different factor intercorrelations, has implications for the construct interpretation of value measures, and for their use in counseling and guidance. (Author/GK)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED213760

VALIDITY AND SEX DIFFERENCES IN THE STRUCTURE OF ADOLESCENT VALUES

Richard M. Jaeger and Carol Kehr Tittle
University of North Carolina - Greensboro

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☒ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

R. M. Jaeger

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

TM 820 195

Presented at the Annual Meeting of the American Educational Research Association, New York City, March, 1982.

INTRODUCTION AND BACKGROUND

Two perspectives provide the theoretical framework for this study. The first is the expanded view of test validity provided by Messick (1980; 1981). He concludes that construct validity is of paramount importance, and expands notions of construct validity to encompass both evidential and consequential bases of test interpretation and test use. In prior studies related to bias, factor analyses have been used to confirm that a set of measures is "unbiased" in a construct validity sense for different groups. Caldwell (1980), for example, presented a confirmatory factor analysis to establish the factorial stability and invariance of non-cognitive measures across students grouped by sex and race/ethnicity. The instruments used were measures of self-concept and intergroup relations, and the subjects were fifth-grade students. Caldwell concluded that differential construct validity was not demonstrated, since factor patterns were invariant across groups. More directly related to the present study, two analyses of career interest measures resulted in different factor patterns for male and female adolescents. (Tuck and Keeling, 1980; Lybarger, 1978). Also, Mahoney, Heretick and Katz (1979) found distinct factor structures for each sex with a form of the Rokeach Value Survey. However, none of these studies tested hypotheses of factor pattern invariance using a linear structural relations model. The results are thus suggestive,

but not confirmatory.

The second perspective is that of career theory, in which there has been an almost exclusive concern with occupational roles despite many studies that have shown differences in occupational choice and work patterns for females and males (Tittle, 1981, Chapter 2). Exploratory factor analyses of combined sets of occupational values, marriage values, and parenthood values examined in this study resulted in two factors for males which were defined exclusively by occupational values. For females, the occupational values were always accompanied by marriage and parenthood values when factors were defined. Exploratory analyses of each value set separately resulted in different factor structures for females and males.

The present study complements and extends the analyses conducted by Tittle (1981) in several ways. First, it provides confirmatory maximum likelihood estimates of factor loadings and factor intercorrelations, based on the factor patterns found in her exploratory analyses. Second, and most important, it provides statistical tests of hypotheses that factor structures and patterns of values are invariant for female and male adolescents. The confirmation of different factor structures and patterns, as well as different factor intercorrelations, would have implications for the construct interpretation of value measures, and for their use in counseling and guidance.

PROCEDURE

Data Collection

Data were collected through 600 face-to-face interviews of 11th-graders in the public and parochial schools of New York City. Respondents included equal numbers of students of both sexes, ; equal numbers of white, black, and Hispanic students; and equal numbers of low socioeconomic status, and middle socioeconomic status students. The 2 by 3 by 2 design for data collection thus had 50 students per cell.

The data used in this study were collected in the context of a four-part interview. In the first part, students provided responses to various demographic questions such as age, place of birth, marital status, religion, etc. and to various questions on the occupational histories of their mothers and fathers. In the second part, students were asked questions about their occupational expectations and aspirations and about the existence and nature of personal role models.

The principal data used here were collected in the third part of the interview. In this part, students ranked and then rated sets of values related to the choice of an occupation, the decision to marry, and the decision to become a parent. The first set consisted of ten occupational values developed by Katz (1966; 1973). Each value was defined on a separate 3x5 card, the cards were placed in front of the student being interviewed, and the following instructions were given:

THESE CARDS DESCRIBE VALUES OR SATISFACTIONS THAT PEOPLE MIGHT CONSIDER IMPORTANT IN CHOOSING AN OCCUPATION. READ THROUGH THEM AND THINK ABOUT WHICH ONES ARE IMPORTANT TO YOU. TELL ME IF YOU FIND ANYTHING THAT YOU DON'T UNDERSTAND.

The occupational values were as follows:

High Income An Occupational Value -- Some money is important to everyone. But how important are the extras? People have different ideas about how much income is "high." So HIGH INCOME is not a specific amount. It means more than enough to live on. It means having extra money. You can buy things you don't need.

Prestige An Occupational Value -- If people respect you, look up to you, listen to your opinions, or ask for your help in community affairs, you are a person with PRESTIGE. Of course, PRESTIGE can be gained in several ways. But in present-day America, occupation is usually the key to PRESTIGE. Rightly or wrongly, we respect some occupations more than others.

Independence An Occupational Value -- Some occupations give you more freedom than others to make your own decisions. In some jobs you work without supervision or direction from others. Free-lance artists or writers may work without supervision. On the other hand, soldiers or people in big business organizations may not be able to make many decisions.

Helping Others An Occupational Value -- Most people are willing to help others; they like to do things for their friends and neighbors. But THIS DOES NOT COUNT HERE. The question here is, Do you want HELPING OTHERS to be a main part of your work? How much do you want to help people as part of your job?

Security An Occupational Value -- In the most SECURE occupations, you will not be afraid of losing your job. You do not have to worry about being fired or being replaced by a machine. You can count on your paycheck on Friday, and you know in advance how much it will be.

Variety An Occupational Value -- Occupations with the greatest variety haven many different kinds of activities and problems, many changes and new people to meet. VARIETY is the opposite of doing the same thing over and over. If you like VARIETY, you probably like new things and surprises, and like new problems, places and people.

Leadership An Occupational Value -- Do you want to lead others, tell them what to do, be responsible for their work? People who want LEADERSHIP usually like to control things. If they are mature, they know that RESPONSIBILITY goes with

LEADERSHIP. They are willing to accept the blame when things go wrong, even though it was not their fault.

Work in Your Main Field of Interest An Occupational Value -- Some people have only ONE MAIN FIELD OF INTEREST, for example, Science, Art, Verbal, Mechanics, Personal Contact, or Administration. Others are interested in more than one field. Most people want to have interesting work, BUT THIS DOES NOT COUNT HERE. Are there several fields in which you could find work that is satisfying to you? Or, how important is it to you that your work is in your main field of interest?

Leisure An Occupational Value -- How important is the amount of time your occupation will allow you to spend away from work? LEISURE may include short hours, long vacations, or the chance to choose your own time off. To give a high weight to LEISURE is like saying, "The satisfactions I get off the job are so important to me that work must not interfere with them."

Early Entry An Occupational Value -- How important is it to you to start working right away? You can start some jobs with very little education or training. Others need years of education. If EARLY ENTRY is important to you, you do not want more education or training. If you are willing to spend time, effort and money for more education, EARLY ENTRY is not important to you.

Students were told to rank each of the occupational values, in order of importance to them. Then they were told to rate each of the ten values using a nine-point scale, with scale points labeled "Not important at all" (0) to "greatly important" (8).

After students had finished ranking and rating the ten occupational values, they were asked to do the same thing with a set of marriage values. Their specific instructions were as follows:

WHEN YOU ARE MARRIED (AND HAVE A PERMANENT RELATIONSHIP) YOU CAN BE WITH SOMEONE YOU LOVE. THESE CARDS DESCRIBE OTHER VALUES OR SATISFACTIONS THAT PEOPLE MIGHT CONSIDER IMPORTANT IN DECIDING TO GET MARRIED. TELL ME IF YOU FIND ANYTHING YOU DON'T UNDERSTAND.

The complete texts for the eleven marriage values can

be found in Tittle (1981). The headings for the values were: Financial Security, Emotional Support, Helpmate, A Close Physical Relationship, Prestige, A Normal Life, A Permanent Companion, Children, Your Own Home, Someone to Rely On, and A Feeling of Leadership.

Students were told to rank the values and then to rate each one on the same nine-point scale used for the occupational values.

The final value set, also developed by Tittle (1981), consisted of twelve value statements concerned with the decision to have children. The headings for these values were: A Sense of Accomplishment, A Sense of Pride, Variety, Friendship, The Respect of Others, A Stable Marriage, A Chance to Express Love, Confidence as a Man or Woman, Joy, Future Security, A Tie to the Future, and A Sense of Importance. The full texts of the value statements can be found in Tittle (1981).

Students again ranked these values, and then provided ratings for each on the nine-point scale used to rate the other value sets.

Data Analysis

Correlations of the ratings given each pair of values in each of the three sets were first computed separately for the 300 male and 300 female students. The six resulting correlation matrices were then used to complete exploratory factor analyses of each value set for males and for females.

The SPSS factor analysis program (Nie, et al., 1975) was used for all exploratory analyses. The principal factor

solutions were rotated to simple structure using the varimax orthogonal method and the direct oblimin oblique method with several specifications of the degree of correlation among the factors.

Plots of the varimax solutions in two dimensions were examined to determine the apparent intercorrelations among the factors. Cosines of estimated angles subtended by pairs of factors were used to select appropriate oblimin rotations.

The factor patterns of selected oblimin rotations were used to determine the pattern specifications of confirmatory factor analyses and appropriate starting values for the LISREL IV computer program (Joreskog and Sorbom, 1978).

To examine the principal research question of this study -- whether factorial structures of value sets are identical or significantly different for female and male high school students -- the correlation matrices resulting from each of the three value sets were used in five confirmatory factor analyses, as follows: (1) The factor pattern resulting from an exploratory analysis of a correlation matrix of male students' ratings was specified for students of both sexes in a confirmatory analysis. Not only was the male students' pattern specified for students of both sexes, but the factor loadings, correlations among factors, and the estimated error variance of each variable were constrained to an identical solution for both females and males. These restrictive specifications imply that the

factor structure and loadings that exist for male students are also appropriate for female students.

(2) In this step, the factor pattern that resulted from the exploratory analysis of male students' ratings was specified to hold for female students as well. However, the LISREL IV program was used to estimate separate factor loadings, correlations among factors, and error variances of variables for male and female students. Thus the second step significantly relaxed the constraints applied in the first confirmatory analysis.

(3) In the third type of confirmatory analysis, separate factor solutions were determined for female and male students. The patterns of factor loadings determined in separate exploratory analyses of female and male students' ratings were used to specify factor patterns for the LISREL IV program, and factor correlations and communalities resulting from these exploratory analyses were used to specify starting values for the LISREL IV program.

(4) This step in the analysis was identical to the first step described above, except that a pattern of factor loadings found in an exploratory analysis of female students' ratings was used to specify the confirmatory pattern matrix for both male and female students. In addition, the confirmatory factor loadings, intercorrelations among factors, and error variances of variables were constrained to be identical for males and females. In Step (4), then, the female factor solution was assumed to apply to students of both sexes.

(5) In the final analytic step, the pattern of factor loadings determined in an exploratory analysis of female students' ratings was again specified to apply to the ratings of both female and male students, but factor loadings, intercorrelations among factors, and error variances of variables were allowed to differ for each sex group. This solution was thus less restrictive than that required in Step (4), but more restrictive than the specifications of Step (3).

An important advantage of confirmatory factor analysis is that it provides a chi-square test of the goodness of fit of a solution. When factor analyses are hierarchically restrictive, as is true here, it is possible to use Cochran's Theorem to determine the significance of differences in goodness-of-fit statistics. We were thus able to determine whether factor solutions that allowed separate loadings and patterns for female and male students provided significant improvements in fit, compared to more-restrictive models that presumed identical value structures for both sexes.

RESULTS AND DISSCUSSION

Confirmatory Factor Patterns

Matrices of factor loadings resulting from patterns found in exploratory analyses, but values determined through confirmatory analyses of female and male students' ratings of ten occupational value statements, are shown in Tables 1

and 2, respectively. Companion tables contain estimates of intercorrelations and angular relationships among the factors, in degrees of arc.

Insert Tables 1 and 2 About Here

The first occupational factor for female students is defined by the Income, Prestige, and Security values. All three variables have moderately high loadings on this factor. These variables are examples of extrinsic rewards offered in great degree by some jobs, and far less so in others.

The second occupational factor for females is defined by the relatively high loading of Security. Two other values, Helping Others and Work in Your Main Field of Interest, also load on this factor. However, the loadings are quite small and less than ten percent of the variance of either of these variables is contained in a common factor space. It is interesting to note that occupational Security appears strongly in the first two factors that resulted from the analysis of female students' ratings, despite the near orthogonality of these factors and their slight negative correlation. Perhaps this result is a consequence of the intrinsic nature of the other values that load on Factor 2 and the extrinsic nature of the other values that load on Factor 1.

The third occupational values factor defined by the female students' ratings is dominated by Leisure, but also

reflects modest loadings of Independence and Variety, and the very small portion of the variance of Early Entry that falls in the common factor space. Students with high scores on this factor might be characterized as looking for interesting work that does not play a major role in their lives.

The fourth factor derived from the analysis of female students' ratings of occupational values is defined totally by the Leadership value. As might reasonably be expected, this factor correlates most highly with Factor 1 (which we have characterized as an extrinsic rewards factor), and is nearly orthogonal to Factor 2 (our intrinsic rewards factor).

Comparison of Tables 1 and 2 reveals that patterns of factor loadings of the ten occupational values are substantially different for female and male students. The first factors for both groups have the Income and Security values in common. But in the male students' ratings, Leisure, and to a small degree, Early Entry also load on this factor. It appears that the extrinsic rewards of work that are valued by female and male students differ in their organization and prominence.

The second factor resulting from the male students' ratings is essentially defined by the Independence value, although three other variables also show small loadings. It is interesting to note that a far higher proportion of the variance of Independence falls in the common factor space in the male students' ratings than in those of the female

students. Conversely, somewhat more of the variance of Helping Others and Variety falls in the common factor space of the females' ratings. At least in part, these findings are consistent with traditional stereotypes.

The third factor resulting from the males' ratings of occupational values shows high loadings of Prestige and Leadership. This is in marked contrast to the female students' pattern, where Leadership stood alone. Perhaps females associate any outside employment with leadership, whereas male students find prestige in jobs that permit them to lead others. Alternatively, males might perceive leadership to be a component of prestigious occupations.

The fourth factor that resulted from the analysis of male students' ratings was defined totally by the Work in Your Main Field of Interest value. This factor had negligible correlations with the first three factors, suggesting that the variable might be of unique significance to some males.

Tables 3 and 4 contain the results of confirmatory factor analyses of female and male students' ratings of eleven marriage values. A cursory comparison of the factor patterns shown in these tables suggests both similarities and important differences between them. For example, Financial Security, Prestige, Your Own Home, and A Feeling of Leadership are values common to the first factors defined by both females' and males' ratings. Although the value A Normal Life also appears in the first factor resulting from

female students' ratings, it is a major component of the third factor defined by male students' ratings. For female students, Factor 1 appears to reflect a combination of a quest for independence through marriage (reflected by their valuing of financial security, the opportunity to have their own home, and leadership opportunity), and the desire to gain societal approval (as reflected by their valuing of Prestige and A Normal Life). The similarity of loadings on Factor 1 in the analysis of male students' ratings suggests essentially the same interpretation. The association of Prestige and A Normal Life in the pattern found for females, but not in the pattern found for males, perhaps reflects the greater societal pressure on women to marry, have a family, and conform to the American ideal of a nuclear family.

Insert Tables 3 and 4 About Here

The second factor resulting from the analysis of female students' ratings centers on the emotional benefits to be gained from a partner in a stable relationship. The values Emotional Support, Helpmate, and A Close Physical Relationship have moderately high loadings on Factor 2. Statements in the definitions of these three values; e.g., "Married people can support each other during rough times.", "With someone to help you, you can share these household responsibilities.", and "Marriage can give you a close physical relationship.", all speak to the partnership aspects of marriage.

For male students, these same partnership values have

at least moderate loadings on Factor 2, but the definition of the factor is complicated by the moderately high loadings of Children and Someone to Rely On. Perhaps the second factor for male students is more broadly indicative of a desire for stability in the sense of engaging in a recognized, lasting institution, in contrast to the female students' valuing of the emotional support a mate can provide.

The third factor resulting from the analysis of female students' ratings is defined principally by their valuing of A Permanent Companion and Someone to Rely On, although Children and Your Own Home have small to moderate loadings on this factor. In contrast to the valuing of emotional support, as reflected in Factor 2, this factor appears to reflect a quest for stability and permanence.

The moderately high loadings of A Normal Life and A Permanent Companion on Factor 3 in the male solution suggest that males as well as females might value marriage because it is sanctioned by society as an appropriate course in life. To a greater degree than is true for females, a period of exploration and irresponsibility is sanctioned by society for males. However, males are socialized to believe that eventually they should "settle down" with someone permanently. Hence the association of permanence and normality.

The tables of intercorrelations among factors that accompany Tables 3 and 4 show a striking similarity in the

angular relationships among the factors that emerged from the analyses of females' and males' ratings. In both cases, the factors were far from orthogonal. There was a marked tendency for those with high scores on one marriage factor to have relatively high scores on other marriage factors.

The results of confirmatory factor analyses of values associated with the decision to have children are shown in Tables 5 and 6 for female and male students, respectively. For this value set, the patterns of loadings that define the first factor are strikingly similar for female and male students. Moderate to high loadings on this factor were found for The Respect of Others ("Becoming a parent earns you the respect of [your friends and family]"); A Stable Marriage ("Being a parent can give you a stable marriage"); Confidence as a Man or Woman ("Your own child can give you a feeling that you are a real woman or man."); Future Security ("When you get old, you can turn to your children for help."); A Tie to the Future ("Parenthood means you leave something of yourself to the future."); and A Sense of Importance ("When you have children you become an important person."). All of these values are associated with the enhancement of self-image or with the kind of stability that is gained from social approval for having children and a legacy to the future. The emotional rewards or satisfactions that can derive from parenthood do not appear in the first parenthood factor for students of either sex.

Insert Tables 5 and 6 About Here

Only one value, Variety ("There is always something new and different in life with chidren."), is common to the second factors that resulted from analyses of males' and females' ratings. For females, Factor 2 is defined principally by valuing of the personal achievement that derives from raising children, and the glory that reflects upon parents when their children achieve. However, Variety has a moderately high loading on this factor in the pattern for females.

For males, Factor 2 is composed of values that reflect the emotional satisfaction of having children. Friendship ("Children can be close friends to their parents."); A Chance to Express Love ("You can hug and cuddle young children."); and Joy ("A home with children can be sunny and happy.") have moderately high loadings on this factor. Variety is also associated with these personal warmth values by males.

Factor 3 in the pattern for female students is very similar to Factor 2 in the pattern for males. However the loadings of Friendship, A Chance to Express Love, and Joy are more modest, and Variety does not appear in females' Factor 3. For males, Factor 3 is similar to females' Factor 2; it is defined by the high loadings of A Sense of Accomplishment and A Sense of Pride. Very clearly then, males with high scores on Factor 3 value the personal accomplishments of having children as well as the approval they might gain through the achievements of their children.

The intercorrelation of Factors 1 and 2 is substantially higher for female students than for males. Otherwise, the correlations among the remaining pairs of factors are moderate, and are quite similar for students of both sexes. As was true of the marriage values factors and the occupational values factors, the factors that resulted from analyses of parenthood values are far from orthogonal.

Statistical Tests

A principal advantage of confirmatory factor analysis is that it provides explicit statistical tests of the comparability of factor patterns in two or more populations. We made use of this property in examining the equivalence of the factor patterns of values for male and female students.

As described above in the Procedures Section, we conducted a sequence of confirmatory analyses that differed in the models assumed and the constraints imposed, for each set of value statements. In one analysis, we assumed that the pattern of factor loadings that resulted from a separate, exploratory factor analysis of the males' ratings would hold for female students as well. We further required that the magnitude of the loadings and the correlations among factors be the same for both males and females. We termed this analysis Step (1). In Step (2), we relaxed the requirement that the magnitude of the factor loadings and the factor intercorrelations be the same for both groups, but retained the assumption that the male pattern would apply to both groups.

Tables 7 through 9 contain goodness-of-fit statistics (chi-square values) that resulted from these analysis steps and three others described below, for each set of values.

Insert Tables 7 through 9 About Here

In Step (3), we used the LISREL IV computer program to produce estimated factor loadings and factor inter-correlations under the most liberal assumptions that the factor patterns as well as the magnitudes of all estimates might be different for students of both sexes.

Step (4) was identical to Step (1), except that the role of the male and female models was reversed. Here we assumed that the factor pattern determined through an exploratory analysis of female students' ratings would apply to males as well. We also required that the magnitudes of corresponding loadings and factor intercorrelations be the same for students of both sexes.

In the final Step (5), we assumed that the female pattern of factor loadings would also hold for males, but that the magnitudes of all estimates could differ across the two sex groups.

In Tables 7 through 9, the chi-square values and associated degrees of freedom resulting from analyses of the Occupational Values, Marriage Values, and Parenthood Values ratings, respectively, suggest significant deviations from perfect fit of any assumed model. For each analytic step, the reported chi-square statistics are considerably larger than their associated degrees freedom. However,

experience with the LISREL IV program has led many analysts to regard large chi-square values with caution when associated degrees of freedom are also large. An accumulation of small residuals can inflate the statistic, even when systematic deviations from an hypothesized model are not appreciable.

Of greater importance to the research issue examined here are the chi-square values associated with differences between models that incorporate increasingly relaxed assumptions about the comparability of male and female factor patterns. For example, in going from Step (1) to Step (2), we retained the assumption that the male pattern of factor loadings would also apply to females, but allowed the magnitudes of loadings and factor correlations to differ. For Occupational Values and Marriage Values, this change did not result in a significant improvement in the fit of the model to the data. Somewhat smaller chi-square values resulted from the Step (2) model, but corresponding reductions in residual degrees of freedom accounted for essentially all of the change. In the case of the Parenthood Values, a significant improvement in model fit ($p < .005$) was associated with the change from the model used in Step (1) to the model used in Step (2).

In every case, allowing the two groups to have separate patterns of factor loadings, in addition to separate estimates -- that is, going from Step (2) to Step (3) -- resulted in statistically significant improvements in model fit. For

each set of values, the reduction in the chi-square value from Step (2) to Step (3) was significant at the .005 level.

Comparison of the goodness-of-fit statistics associated with Steps (1) and (3) is most central to the question of whether individual factor patterns provide a significantly better fit to the data than do the male models imposed on both sex groups. From Table 7 we see that individual models afford an improvement in fit to the data on Occupational Values that is significant at the .025 level. Tables 8 and 9 show that individual models provide data fits that are significantly better than the male model ($p < .005$) for both the Marriage Values and the Parenthood Values.

Comparison of the results of Steps (4) and (5), Steps (4) and (3) and Steps (5) and (3) are pertinent to the question of whether individual factor patterns and loadings provide signficantly better fit to the values data than do models derived from the exploratory analyses of female students' ratings. The conclusions for the female models are virtually identical to those discussed for the male models. For all three value sets, the individual factor patterns and loadings fit the data significantly better than do the female models. The improvement in going from Step (4),(female pattern and loadings) to Step (3), (individual pattern and loadings), was significant at the .005 level for the Marriage Values and the Parenthood Values, and at the .05 level for the Occupational Values. Retaining the requirement that the female factor pattern apply to both sex groups, but allowing separate loadings and factor

correlations, did not result in an improvement in fit that was statistically significant for Occupational Values (see Table 7), but did result in significant improvements for the other two value sets (see Tables 8 and 9).

For all value sets then, it is clear that the factor patterns and factor loadings resulting from individual solutions for male and female students differed significantly.

CONCLUSIONS AND IMPLICATIONS

The results of the present study show that significantly different factor patterns and loadings are found from analyses of eleventh-grade female and male students' ratings of the values used in the Career Decision Making Study. While earlier exploratory analyses of all three value sets (based on ratings standardized within individuals) also revealed sex differences (Tittle, 1981, pp. 283-291), these results had not been confirmed through systematic, statistical comparisons of common and separate factor analytic models.

Factor analysis has traditionally played a role in the construct validation of psychological measures. In studies of test "bias" such analyses have contrasted relationships among the performances of majority and minority groups to determine whether the same construct was being measured. In the present study, the differences in factor patterns found for the two groups raise the question of whether the values

should be treated as valid measures of the same constructs when interpreted for females and males. The research literature on occupational patterns of women and men highlights differences in the types of occupations they enter, their processes of occupational attainment (Marini, 1980), as well as differences in their traditional views and sex roles Bernard (1981). This suggests that differences in the factor loadings and patterns of female and male students' ratings of occupational values are to be expected. The findings of this study could therefore be interpreted as supporting the construct validity of the occupational values, since a common set of factorial relationships for both sexes would be inconsistent with criterion behavior.

However, Messick's (1981) expansion of the concept of measurement validation, incorporates the requirement that evidentiary and consequential bases for valid test use be established. This suggests that any application of the values to counseling must consider differences in their structural organization for the two sex groups. Messick states that the evidential basis for appropriate test use consists of construct validity plus relevance and utility. Relevance considers the construct in relation to the particular (applied) purpose for giving a test, and utility is concerned with the test's practicality in an applied setting. Relevance can be interpreted on several levels. On the most immediate level it may refer to the student's (examinee's) perception of the relationship between the

measure (the values, in this study), the student's response to the measure (ratings, in this study), and the student's purpose. On another level, relevance is concerned with the actions the examinees take, or don't take, based on their examination of the outcomes of measurement. In this study, the latter interpretation of relevance would apply to the actions students chose to take in response to an interpretation of their ratings of the values. At a third level, relevance can be interpreted as a requirement that the information resulting from measurement fit within the framework the examinee uses to define the construct. In this study, the students would have to be able to fit the results of their ratings into their personal model of the relationships between careers, marriage, and parenthood. For example, occupational values may have one meaning if a student considers the worker role to be the most salient and dominant of adult roles, but another meaning if the worker role is less dominant or equal in salience to other adult roles; e.g., marriage partner and parent. The relative salience of the worker, partner and parent roles typically differs for females and males.

Other studies of the occupational, marriage, and parenthood values have shown that the three value sets overlap to a limited degree. Use of the three value sets may have particularly high relevance for some females (since in earlier studies there were no factors that consisted of occupational values only, as there were for males). Counselors may be able to assist young women to distinguish

the values that can be satisfied in the three major adult roles of worker, marriage partner, and parent. For some young men, use of the values results in a somewhat different framework within which to think about career-related decisions and specific occupations. For example, a view of a more egalitarian marriage and a desire to undertake responsibility in parenting may change the salience of the worker role and hence the framework within which career-related decisions are made.

The difference in the number of factors found for the three sets of values suggests that further work on all value sets would be useful. The number of value statements might be reduced, and new values might be defined. There may be more "homogeneity" in the way in which individuals perceive marriage and parenthood factors than in the way they view occupational factors. As Cronbach and Meehl (1955) have noted, the task of construct validation is never completed. Purposeful modification of the value sets might lead to different conceptions of the ways in which adolescents organize their adult role values.

REFERENCES

Bernard, J. The female world. New York: The Free Press,1981.

Caldwell, J. The factorial stability and invariance of noncognitive measures across student sex and race/ethnicity. Paper presented at the Annual Meeting of the American Educational Research Association, Montreal, April, 1980.

Cronbach, L. J. & Meehl, P. E. Construct validity in psychological tests. Psychological Bulletin, 1955, 52,281-302.

Joreskog, K. G. & Sorbom, D. LISREL User's Guide. Chicago: International Educational Services, 1978.

Katz, M. A model of guidance for career decision-making. Vocational Guidance Quarterly, 1966, 15, 2-10.

Katz, M. Career decision-making: A computer-based system of Interactive Guidance and Information (SIGI).Proceedings of the 1973 ETS Invitational Conference. Princeton, NJ: Educational Testing Service, 1973, 43-69.

Lynbarger, W. M. A multivariate analysis of the occupational interest domain of twelve hundred college men and women. Dissertation Abstracts International, 1978, 39(2-B), 957.

Mahoney, J.,Heretick, D. M. L., & Katz, G. M. Gender specificity in value structures. Sex Roles: A Journal of Research, 1979, 5, 311-318.

Marini, M. M. Sex differences in the process of occupational attainment: a closer look. Social Science Research, 1980,9, 307-361.

Messick, S. Test validity and the ethics of assessment. American Psychologist, 1980, 35, 1012-1027.

Messick, S. Evidence and ethics in the evaluation of tests. Paper presented at the Annual Meeting of the American Educational Research Association, Los Angeles, April, 1981.

Nie, N., Hull, C., Jenkins, J., Steinbrenner, K., & Bent, D. Statistical Package for the Social Sciences (2nd ed.), New York: McGraw-Hill, 1975.

Tittle, C. K. Careers and family: Sex roles and adolescent life plans. Beverly Hills, CA: Sage, 1981.

Tuck, B. F. & Keeling, B. Sex and cultural differences in the factorial structure of the SDS. Journal of Vocational Behavior, 1980, 16, 105-114.

TABLE 1

Confirmatory Factor Pattern of Female Students' Ratings of Ten Occupational Value Statements

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Proportion Error Variance
Income	.651	0	0	0	.577
Prestige	.489	0	0	0	.761
Independ.	0	0	.361	0	.870
Help Others	0	.272	0	0	.926
Security	.588	.717	0	0	.363
Variety	0	0	.332	0	.890
Leadership	0	0	0	.678	.540
Work in Field	0	.284	0	0	.919
Leisure	0	0	.650	0	.577
Early Entry	0	0	.225	0	.949

Intercorrelations Among Factors and Angles Between Factors

	Factor 1	Factor 2	Factor 3
Factor 2	-.264/105*		
Factor 3	.599/ 53	-.126/ 97	
Factor 4	.574/ 55	-.280/106	.433/ 64

*correlation/angle in degrees

TABLE 2

Confirmatory Factor Pattern of Male Students' Ratings of Ten Occupational Value Statements

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Proportion Error Variance
Income	.765	-.141	0	0	.466
Prestige	0	0	.607	0	.632
Independ.	0	.846	0	0	.284
Help Others	0	.135	0	0	.982
Security	.426	0	0	0	.818
Variety	0	.218	0	0	.952
Leadership	0	0	.512	0	.738
Work in Field	0	0	0	.494	.756
Leisure	.464	0	0	0	.785
Early Entry	.250	0	0	0	.938

Intercorrelations Among Factors and Angles Between Factors

	Factor 1	Factor 2	Factor 3
Factor 2	.330/ 71*		
Factor 3	.485/ 61	.380/ 68	
Factor 4	.206/ 78	.176/ 80	.093/ 85

*correlation/angle in degrees

TABLE 3

Confirmatory Factor Pattern of Female Students' Ratings of Eleven Marriage Value Statements

Variable	Factor 1	Factor 2	Factor 3	Proportion Error Variance
Finan. Secur.	.469	0	0	.780
Emot. Support	0	.548	0	.699
Helpmate	0	.586	0	.656
Physical Relat.	0	.412	0	.830
Prestige	.652	0	0	.574
Normal Life	.397	0	0	.843
Perm. Compan.	0	0	.697	.514
Children	0	0	.337	.886
Own Home	.338	0	.320	.683
Rely On	0	0	.668	.554
Feeling Lead.	.613	0	0	.624

Intercorrelations Among Factors and Angles Between Factors

	Factor 1	Factor 2
Factor 2	.559/ 56*	
Factor 3	.460/ 63	.580/ 54

*correlation/angle in degrees

TABLE 4

Confirmatory Factor Pattern of Male Students' Ratings of Eleven Marriage Value Statements

Variable	Factor 1	Factor 2	Factor 3	Proportion Error Variance
Finan. Secur.	.471	0	0	.778
Emot. Support	0	.272	0	.926
Helpmate	0	.444	0	.803
Physical Relat.	0	.468	0	.781
Prestige	.545	0	0	.702
Normal Life	0	0	.543	.705
Perm. Compan.	0	0	.494	.756
Children	0	.459	0	.790
Own Home	.549	0	0	.699
Rely On	0	.518	0	.731
Feeling Lead.	.618	0	0	.618

Intercorrelations Among Factors and Angles Between Factors

	Factor 1	Factor 2
Factor 2	.571/ 55*	
Factor 3	.510/ 59	.520/ 59

*correlation/angle in degrees

TABLE 5

Confirmatory Factor Pattern of Female Students' Ratings of Twelve Parenthood Value Statements

Variable	Factor 1	Factor 2	Factor 3	Proportion Error Variance
Sense Accomp.	0	.755	0	.430
Sense Pride	0	.788	0	.380
Variety	0	.525	0	.725
Friendship	0	0	.484	.765
Respect of Other	.685	0	0	.531
Stable Marriage	.692	0	0	.521
Express Love	0	0	.503	.747
Confidence	.708	0	0	.498
Joy	0	0	.352	.876
Future Secur.	.689	0	0	.525
Tie to Future	.497	0	0	.753
Sense Importance	.694	0	0	.518

Intercorrelations Among Factors and Angles Between Factors

	Factor 1	Factor 2
Factor 2	.586/ 54*	
Factor 3	.439/ 64	.400/ 66

*correlation/angle in degrees

TABLE 6

Confirmatory Factor Pattern of Male Students' Ratings of Twelve Parenthood Value Statements

Variable	Factor 1	Factor 2	Factor 3	Proportion Error Variance
Sense Accomp.	0	0	.820	.327
Sense Pride	0	0	.708	.499
Variety	0	.482	0	.768
Friendship	0	.581	0	.662
Respect of Other	.668	0	0	.554
Stable Marriage	.542	0	0	.706
Express Love	0	.613	0	.624
Confidence	.704	0	0	.505
Joy	0	.692	0	.522
Future Secur.	.593	0	0	.648
Tie to Future	.495	0	0	.755
Sense Importance	.667	0	0	.556

Intercorrelations Among Factors and Angles Between Factors

	Factor 1	Factor 2
Factor 2	.303/ 72*	
Factor 3	.486/ 61	.308/ 72

*correlation/angle in degrees

TABLE 7

Goodness-of-Fit Statistics for
Various Factor Analytic Models,
Based on Students' Ratings of Ten Occupational Values

Analysis	Model	Chi-Square Value	Degrees of Freedom
Step (1)	Male Model	145.12	84
Step (2)	Male Pattern	123.22	58
Step (3)	Individual Model	101.77	58
Step (4)	Female Model	141.43	83
Step (5)	Female Pattern	121.39	58

Differences in Goodness-of-Fit Statistics as a Function of
Relaxation of Constraints on Factor Analytic Models,
Based on Students' Ratings of Ten Occupational Values

Change in Model	Chi-Square Value	df	Significance Level
Step(1) to Step(2)	21.90	26	> .500
Step(2) to Step(3)	21.45	1	< .005
Step(1) to Step(3)	43.35	26	< .025
Step(4) to Step(5)	20.04	25	> .500
Step(4) to Step(3)	39.66	25	< .050
Step(5) to Step(3)	19.62	1	< .005

TABLE 8

Goodness-of-Fit Statistics for
Various Factor Analytic Models,
Based on Students' Ratings of Eleven Marriage Values

Analysis	Model	Chi-Square Value	Degrees of Freedom
Step (1)	Male Model	302.86	107
Step (2)	Male Pattern	276.63	82
Step (3)	Individual Model	223.29	81
Step (4)	Female Model	290.09	109
Step (5)	Female Pattern	245.15	86

Differences in Goodness-of-Fit Statistics as a Function of
Relaxation of Constraints on Factor Analytic Models,
Based on Students' Ratings of Eleven Marriage Values

Change in Model	Chi-Square Value	df	Significance Level
Step(1) to Step(2)	26.23	25	> .250
Step(2) to Step(3)	53.34	1	< .005
Step(1) to Step(3)	79.57	26	< .005
Step(4) to Step(5)	44.94	23	< .005
Step(4) to Step(3)	66.80	28	< .005
Step(5) to Step(3)	21.86	5	< .005

TABLE 9

Goodness-of-Fit Statistics for
Various Factor Analytic Models,
Based on Students' Ratings of Twelve Parenthood Values

Analysis	Model	Chi-Square Value	Degrees of Freedom
Step (1)	Male Model	306.25	129
Step (2)	Male Pattern	252.28	102
Step (3)	Individual Model	243.42	102
Step (4)	Female Model	296.77	129
Step (5)	Female Pattern	257.09	102

Differences in Goodness-of-Fit Statistics as a Function of
Relaxation of Constraints on Factor Analytic Models,
Based on Students' Ratings of Twelve Parenthood Values

Change in Model	Chi-Square Value	df	Significance Level
Step(1) to Step(2)	53.97	27	< .005
Step(2) to Step(3)	8.86	1	< .005
Step(1) to Step(3)	62.83	27	< .005
Step(4) to Step(5)	39.68	27	< .100
Step(4) to Step(3)	53.35	27	< .005
Step(5) to Step(3)	13.67	1	< .005